Draft Environmental Assessment

2007 Sport Hunt Plan

on

MACKAY ISLAND NATIONAL WILDLIFE REFUGE
Knotts Island, NC

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Figure 1. Location of Mackay Island National Wildlife Refuge.

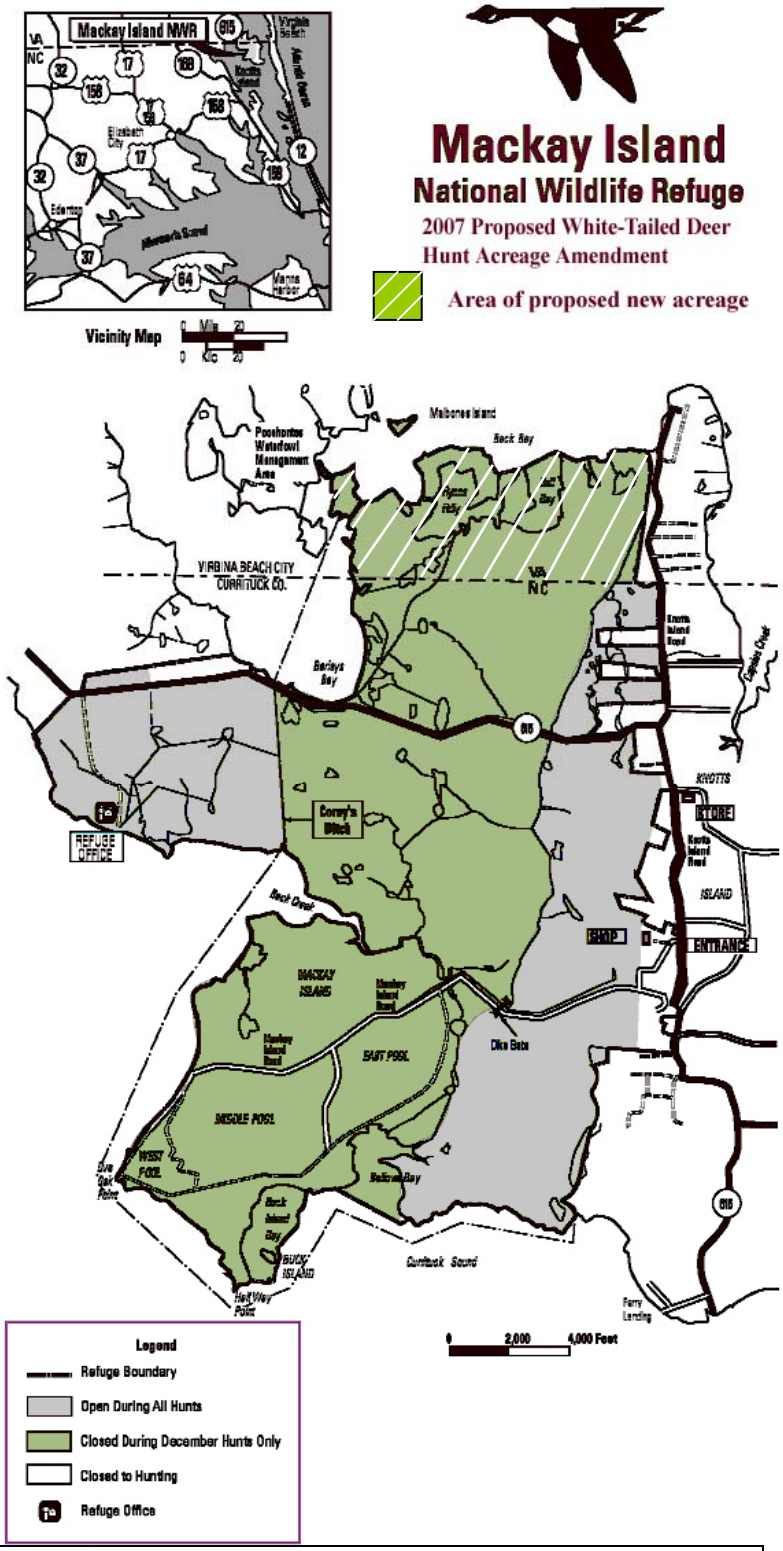

Figure 2. Proposed Mackay Island NWR Hunt Map

Note: Area with pattern is the proposed additional acreage. Other shaded areas indicate area already open for white-tailed deer hunting.

Chapter 1 Purpose and Need for Action

In response to a 2003 lawsuit filed by the Fund for Animals, the U.S. Fish and Wildlife Service (Service) will amend or rewrite environmental assessments that describe hunting programs at twenty-three national wildlife refuges located in the Southeast Region. The environmental assessments will address the cumulative impacts of hunting at all refuges which were named in or otherwise affected by the lawsuit. This document addresses the expansion of the hunting program at Mackay Island National Wildlife Refuge (NWR) into Virginia.

The federally legislated purposes for which Mackay Island National Wildlife Refuge (NWR) was established are "…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds…" (16 U.S.C. Sec. 664; Migratory Bird Conservation Act of 1929) and "…for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species…" (16 U.S.C. Sec k-1; Refuge Recreation Act of 1962).

The National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.) provides authority for the Service to manage the Refuge and its wildlife populations. In addition it declares that compatible wildlife-dependent public uses are legitimate and appropriate uses of the Refuge System that are to receive priority consideration in planning and management. There are six wildlife-dependent public uses: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. It directs managers to increase recreational opportunities including hunting on National Wildlife Refuges when compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

The purpose of this Environmental Assessment is to evaluate the proposal to expand the area open to deer hunting on Mackay Island NWR to include those refuge lands located in the state of Virginia. Deer hunting is currently allowed on the North Carolina portion of the refuge each fall. State regulations and bag limits are enforced, and hunters are required to possess a refuge hunting permit indicating they have read and understood additional refuge-specific regulations. Under this proposal, an additional 880 acres of refuge land would be opened to deer hunting and incorporated into the season framework of the current hunt. The hunting regulations would also be the same as those on refuge lands currently open to hunting (see 2007 Sport Hunting Plan Mackay Island NWR).

The proposed action is needed to implement the 2007 Sport Hunting Plan for Mackay Island NWR which would provide the public with a high quality recreational experience and provide the refuge with a wildlife management tool to promote the biological integrity of the refuge.

Chapter 2 Alternatives Including the Proposed Action

This chapter discusses the two alternatives considered for deer hunting on Mackay Island National Wildlife Refuge. These alternatives are to 1) take no action; continue with current management or to 2) open hunting on the Virginia portion of the refuge (Proposed Alternative).

2.1 No Action Alternative: Current Management

There would be no change to the refuge deer hunting program allowing an expansion into Virgina. Deer hunting would continue on the North Carolina portion of the refuge. No hunting would be allowed on the Virginia portion of the refuge.

2.2 Proposed Alternative: Expand Hunt Area

The proposed action, as outlined in the 2007 Sport Hunting Plan for Mackay Island NWR, expands the area open to hunting to include the Virginia portion of the refuge. Hunters would be allowed to hunt the refuge provided they have the proper state licenses and a signed refuge permit. The hunting season would consist of a maximum of twenty days, spanning the months of September to December. The entire refuge would be open to hunting with the exception of certain areas which would be closed to ensure public safety, to provide wildlife sanctuary, or for administrative reasons. Refer to 2007 Sport Hunting Plan for Mackay Island NWR for details and specific regulations.

Chapter 3 Affected Environment

Mackay Island National Wildlife Refuge (NWR) was established on December 30, 1960. It is located Currituck County, NC and Virginia Beach, VA (Figure 1). The refuge covers a total of 8,219 acres and is bound on the west by the North Landing River, to the north by Back Bay, and to the south and east by Currituck Sound.

The Service established the original acquisition boundary of 7,835 acres in 1961 and expanded the boundary to 9,503 acres in 1991. The Secretary of the Interior issued a proclamation on August 21, 1963, prohibiting waterfowl hunting on 4,621 acres of the refuge and 1,098 acres of water south and west of the refuge.

The proposed acquisitions qualified for funding under the Migratory Bird Conservation Act of 1929 (16 U.S.C. 715-715R) and the Refuge Recreation Act of 1962 (16 U.S.C. Sec 460k-1).

3.1 Physical Environment

Mackay Island NWR is part of an extensive complex of brackish marshes along the North Landing River, Back Bay, Knotts Island Bay, and Currituck Sound area. The marshes are largely undisturbed and protected by several state and local government agencies, non-governmental organizations, as well as the U.S. Fish and Wildlife Service. These areas include Mackay Island, Currituck, and Back Bay National Wildlife Refuges, Northwest Marsh and North River Game Lands, Princess Ann Wildlife Management Area, False Cape State Park, North Landing River and Northwest River Natural Area Preserves, North Landing Park and lands owned by The Nature Conservancy. Refuge visitors will see large expanses of brackish marsh and hardwood/pine forest and the abundant wildlife that use these habitats.

Seventy seven percent of the refuge is hydric soil that is maintained as natural or managed wetlands. Fifty-five percent of the refuge is subject to regular inundation by tidal waters. Water is the driving force of the Mackay Island Refuge's marsh and hardwood/pine forest communities. Water forms and maintains the wetlands by transporting and redistributing sediments from watersheds upstream. It provides seasonal access for aquatic organisms to the marsh and forest and transports nutrients and detritus across the marsh. Sources of water to the area’s hydrologic system include precipitation and runoff and groundwater that originate from it.

The refuge is a typical southeastern United States coastal wetland system that has formed brackish marshes and forested swamps in the Coastal Plain region. There are no federally endangered plant species known to occur on the refuge. The National Wetlands Inventory described the refuge as an estuarine emergent herbaceous or palustrine, forested wetland with deciduous or broad-leafed deciduous vegetation and a water regime ranging from temporarily flooded to semipermanently flooded (Cowardin et al., 1979). Schafale and Weakley (1990) classify the three natural communities within the refuge

boundary as: tidal freshwater marsh, estuarine fringe loblolly pine forest, and mesic pine flatwoods. Other habitats have been altered or created by man.

3.2 Vegetation

Specific acreage by habitat is as follows: 4,774 acres of tidal freshwater marsh, 1,329 estuarine fringe loblolly pine forest, 131 acres mesic pine flatwoods, 200 acres of cropland, 98 acres of grasslands, and 876 acres managed freshwater emergent marsh (moist-soil units). In addition, open water, roads, administrative areas, and firebreaks cover other portions of the refuge. These habitat types and the vegetative species they support are discussed in more detail below.

Tidal Freshwater Marsh (4,774 acres). Marshes tend to occur on the peat soils in the center section of the refuge from Back Bay in the north to the North Landing River in the south. The marshes were brackish when numerous inlets occurred along the Outer Banks; they are now influenced more by freshwater, but still have plants typical of brackish marshes. The Nature Conservancy ranks the marshes as S3, or rare in North Carolina, and G4, or apparently secure globally. They are dominated by black needle rush and saltmeadow cordgrass with big cordgrass, seashore saltgrass, and sawgrass present in substantial quantities. Phragmites is also abundant and increasing in coverage as it displaces these other native species. With frequent fires, the black needle rush is suppressed and the other grasses dominate. In the absence of fire, black needle rush dominates the stand. The staff currently burns the marshes on a 3-year rotation to maintain the diversity of vegetation in the marsh and the palatability of that vegetation.

Estuarine Fringe Loblolly Pine Forest (1,329 acres). The estuarine fringe loblolly pine forest occurs on mineral hydric soils to the east and west of the brackish marsh. The Nature Conservancy ranks the forests as S3, or rare in North Carolina, and G3, or very rare throughout its range. Species in the forest include loblolly pine, red maple, swamp tupelo, sweetgum, green ash, wax myrtle, saltmeadow cordgrass, and phragmites. With frequent fires, the hardwoods and wax myrtle are suppressed and the pine, cordgrass, and phragmites dominate.

Mesic Pine Flatwoods (131 acres). This community is found on the well-drained ridges near Knotts Island Road. The Nature Conservancy ranks the forests as S3, or rare in North Carolina, and G5, or demonstrably very secure. The typical tree species present are sweetgum, American holly, and loblolly pine. Shrubs include dogwood, ironwood, blueberry, and gallberry and the ground cover consists of mixed grasses and sedges. In certain forest stands on the refuge, the understory is infested with Chinese privet, an exotic invasive shrub. The refuge does not actively manage or regularly survey the forest, but does treat outbreaks of insects and diseases as they occur and conducts prescribed burning on an infrequent basis.

Cropland (200 acres). A cooperative farmer grows corn, wheat, and soybeans on the refuge cropland. The farmer plants 50 acres as wheat pasture for migratory geese and swans. The cooperative farmer is required to follow the Cropland Management Plan and

annual Cooperative Farming Agreements to ensure that he produces the crop without damage to the environment.

Grasslands (98 acres). In 2005, 98 acres of cropland was converted to grasslands. Big bluestem, little bluestem, Indian grass, switchgrass, and coastal panic grass were planted in the fields. These species as well as other weed species persist in the fields and are maintained by prescribed fire approximately every three years.

Firebreaks. The refuge manages 2 miles of firebreaks to provide safe defensible edges from which to manage prescribed fires and wildfires. The staff manages the firebreaks to provide low-growing vegetation that will control erosion and produce forage for wildlife.

Moist-soil Units. The refuge manages 876 acres of impoundments as managed wetlands to produce vegetation that will produce seed to feed waterfowl and to expose mudflats that will serve as habitat for invertebrates to feed shorebirds. Water levels are managed to provide optimum hydrological conditions for the establishment of wetland vegetation. Refuge staff mows, burns, and discs this vegetation to maintain it in an early stage of succession that will produce an optimum amount of seed. Refuge staff survey the vegetation annually to monitor the effectiveness of their management.

3.3 Wildlife Resources

Birds. The Fish and Wildlife Service and/or the State of North Carolina and/or the Commonwealth of Virginia list several refuge species as high priority or rare and of special concern. These include the prairie warbler, hooded warbler, black-throated green warbler, yellow-throated warbler, prothonotary warbler, northern parula, sharp-tailed sparrow, northern bobwhite, king rail, black rail, solitary sandpiper, semipalmated sandpiper, black tern, American black duck, American woodcock, short-eared owl, and American kestrel to name a few. Bald eagles are observed frequently and a pair maintain a nest on the refuge. Biologists have rarely seen the endangered red-cockaded woodpecker, with the most recent sighting more than 20 years ago. At least 187 species of birds, including 60 breeding species, utilize the refuge.

Wintering and migrating waterfowl make extensive use of the refuge wetlands. Principle species include the snow goose, tundra swan, mallard, wood duck, American black duck, and American wigeon, green-winged teal, gadwall, and northern pintail. The marshes surrounding Currituck Sound, Back Bay, and Knotts Island Bay provide habitat for a substantial portion of the most of the commonly harvested duck species in North Carolina.

Recent studies (U.S. Fish and Wildlife Service 1983) have shown the importance of wooded wetlands to wintering waterfowl as prime sources of cover and food, providing supplemental dietary needs prior to spring migration, mating, and nesting. Migratory mallards, American black ducks, and some wood ducks utilize coastal fringe evergreen forests primarily in the fall and winter months. They often feed on the vegetable matter

found in shallow water, and for migration and pre-breeding activities they supplement this with the high protein foods found in the wooded wetlands, including acorns; beechnuts; the seeds of buttonbush; bald cypress and tupelo gums; insects; and the abundant floodplain aquatic invertebrates, such as snails, crustaceans, and insects (Bellrose 1976). Other wood ducks move into the area in the late winter and spring to nest in cavities in the standing timber in the coastal fringe evergreen forests.

Mammals. The combination of hard and soft mast producing trees, the availability of cover habitat, and nearby cropland provides forage for a dense white-tailed deer population. Furbearers present include raccoon, mink, muskrat, otter, fox, bobcat, and opossum (Barick and Critcher 1975). Abundant nutria are exotic pests that burrow into impoundment dikes and consume marsh grasses.

Reptiles and Amphibians. The Service has not performed a comprehensive survey of reptiles and amphibians at the Mackay Island NWR. The more commonly observed species include sliders, skinks, numerous species of frogs, and snakes including the fairly abundant cottonmouths.

3.4 Threatened and Endangered Species

After an absence of many years, the threatened bald eagle recently returned to nest on the refuge. Several successful nests have been hatched. Adults and juvenile eagles are observed on the refuge year-round. The only records of the occurrence of the endangered red-cockaded woodpecker in the county are from more than 20 years ago. There have only been incidental reports of the endangered West Indian manatee in the county, well north of their normal range. No other federally threatened or endangered species are known to occur on or adjacent to refuge lands.

3.5 Fishery Resources

Currituck Sound, once known nationally for its famed largemouth bass fishing, no longer supports such a fishery. Several factors are suspected to have contributed to the demise of the water quality and subsequent demises of the fishery and submerged aquatic vegetation in the sound waters. However, the sound and the associated waters in and around the refuge still support healthy populations. The important game species present in refuge waters are: bluegill and several other sunfish species, crappie, largemouth and striped bass as well as an occasional flounder. Other species include white catfish, carp, bowfin, gar, black drum.

3.6 Cultural Resources

The body of federal historic preservation laws has grown dramatically since the enactment of the Antiquities Act of 1906. Several themes recur in these laws, their

promulgating regulations, and more recent Executive Orders. They include: 1) each agency is to systematically inventory the "historic properties" on their holdings and to scientifically assess each property's eligibility for the National Register of Historic Places; 2) federal agencies are to consider the impacts to cultural resources during the agencies' management activities and seek to avoid or mitigate adverse impacts; 3) the protection of cultural resources from looting and vandalism are to be accomplished through a mix of informed management, law enforcement efforts, and public education; and 4) the increasing role of consultation with groups, such as Native American tribes, in addressing how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The U.S. Fish and Wildlife Service, like other federal agencies, are legally mandated to inventory, assess, and protect cultural resources located on those lands that the agency owns, manages, or controls. The Service's cultural resource policy is delineated in 614 FW 1-5 and 126 FW 1-3. In the Service's Southeast Region, the cultural resource review and compliance process is initiated by contacting the Regional Historic Preservation Officer/Regional Archaeologist (RHPO/RA). The RHPO/RA will determine whether the proposed undertaking has the potential to impact cultural resources, identify the "area of potential effect," determine the appropriate level of scientific investigation necessary to ensure legal compliance, and initiates consultation with the pertinent State Historic Preservation Office (SHPO) and federally recognized Tribes.

There is the foundation of the Joseph P. Knapp residence and fourteen cemeteries on the refuge. The refuge does not maintain them, but avoids any intensive management in their vicinity that would damage the graves or their markers. One is on the north side of the entrance road in the northern end on the refuge. A fence surrounds it and private interests maintain the grass cover. The foundation of the Joseph P. Knapp residence is on Live Oak Point in the southeastern part of the refuge. No other significant archaeological resources have been found on the refuge.

3.7 Socio Economic

Mackay Island National Wildlife Refuge lies in Currituck County, North Carolina, and Virginia Beach, Virginia. The refuge affects the environment, society, and economy of these counties more than any other area. The land use in the communities influences the water and air quality in the water bodies surrounding the refuge and on the refuge. These areas are described in more detail below.

Currituck County. Currituck County is in the northeastern corner of North Carolina with the Atlantic Ocean to the east, Dare County, North Carolina to the south, Camden County, North Carolina to the west, and the city of Virginia Beach, Virginia to the north. The county is split into east and west segments by the Currituck Sound. The only bridge over the sound is in the southern part of mainland Currituck County that connects to northern Dare County on the Outer Banks, the barrier island next to the ocean. Knotts Island, where the refuge is located, is accessible by traveling from mainland Currituck County by road through the cities of Chesapeake and Virginia Beach, Virginia, or by ferry across the Currituck Sound.

Despite the difficulty of traveling in the county, Currituck County has experienced a great amount of growth in the last 30 years due its proximity to the city of Virginia Beach. Unemployment and poverty rates are much lower than the state average.

Currituck County is still predominantly rural, and the largest town and the county seat is Currituck (2000 population: 18,190). Like other rural areas throughout the country, outdoor activities are both popular and necessary. Hunting and recreational fishing are popular pastimes and farming, commercial fishing, and forestry are important elements of the economy.

Virginia Beach. Virginia Beach is in the southeastern corner of Virginia with the Atlantic Ocean to the east, Currituck County, North Carolina to the south, Chesapeake and Norfolk, Virginia to the west, and the Chesapeake Bay to the north. Virginia Beach has experienced steady growth in the last 120 years due its proximity to the ocean and access by water, railroad, highways, and air. Unemployment and poverty rates are much lower than the state average.

Virginia Beach occupies the area that was once Princess Anne County and is still 61 percent rural. Like other rural areas throughout the country, outdoor activities are still popular. Hunting and recreational fishing are favored pastimes and farming is still an important element of the economy in the more rural areas.

The demographics and economic status of these two areas are shown in the table below.

Table 1. Demographics and Economic Data of Currituck County, NC and Virginia Beach, VA based on U.S. Census 2000 data.

Area	*Population*	*Median Annual Household Income ($)*	*Poverty Rate (%)*	*Unemployment Rate in 2004 (%)*
Currituck County	18,190	36,287	10.8	2.8
Virginia Beach	425,257	48,705	6.5	3.6

Chapter 4 Environmental Consequences

This chapter describes the foreseeable environmental consequences of implementing the management alternatives in Chapter 2. When detailed information is available, a scientific and analytic comparison among alternatives and their anticipated consequences is presented, which is described as "impacts" or "effects." When detailed information is not available, those comparisons are based on the professional judgment and experience of refuge staff and Service and State biologists

4.1 Effects Common to all Alternatives

4.1.1 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for any of the alternatives unique to minority or low-income populations in the affected area. None of the alternatives disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

4.1.2 Public Health and Safety

Each alternative would have minimal to negligible effects on human health and safety.

4.1.3 Refuge Physical Environment

Impacts of each alternative on the refuge physical environment would have similar minimal to negligible effects. Some disturbance to surface soils, topography, and vegetation would occur, though effects would be minimal. Hunting would have some benefits to vegetation as it would aid in keeping deer populations in balance with the habitat's carrying capacity. The refuge would also control access to minimize habitat degradation.

Impacts to the natural hydrology would have negligible effects. The refuge expects impacts to air and water quality to be minimal and only due to hunters' automobile emissions and run-off from road and trail sides. The effect of these refuge-related activities on overall air and water quality in the region are anticipated to be relatively

negligible.

Impacts associated with solitude are expected to be minimal given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

4.1.4 Cultural Resources

Under each alternative, hunting, regardless of method is a consumptive activity that does not pose any threat to historic properties on and/or near the Refuge. No pit blinds or other activities that impact the soil matrix are associated with either alternative. The body of federal historic preservation laws has grown dramatically since the enactment of the Antiquities Act of 1906. Several themes recur in these laws, their promulgating regulations, and more recent Executive Orders. They include: 1) each agency is to systematically inventory the "historic properties" on their holdings and to scientifically assess each property's eligibility for the National Register of Historic Places; 2) federal agencies are to consider the impacts to cultural resources during the agencies' management activities and seek to avoid or mitigate adverse impacts; 3) the protection of cultural resources from looting and vandalism are to be accomplished through a mix of informed management, law enforcement efforts, and public education; and 4) the increasing role of consultation with groups, such as Native American tribes, in addressing how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The U.S. Fish and Wildlife Service, like other federal agencies, are legally mandated to inventory, assess, and protect cultural resources located on those lands that the agency owns, manages, or controls. The Service's cultural resource policy is delineated in 614 FW 1-5 and 126 FW 1-3. In the FWS's Southeast Region, the cultural resource review and compliance process is initiated by contacting the Regional Historic Preservation Officer/Regional Archaeologist (RHPO/RA). The RHPO/RA will determine whether the proposed undertaking has the potential to impact cultural resources, identify the "area of potential effect," determine the appropriate level of scientific investigation necessary to ensure legal compliance, and initiates consultation with the pertinent State Historic Preservation Office (SHPO) and federally recognized Tribes.

4.1.5 Facilities

Maintenance or improvement of existing facilities (i.e. parking areas, roads, trails, and boat ramps) required to accommodate the hunt will cause minimal short term impacts to localized soils and waters but may cause some wildlife disturbances and damage to vegetation.

4.2 Summary of Effects

4.2.1 Impacts to Habitat

No Action Alternative

Harvest rates of a given population will affect how close that population is maintained to the area's carrying capacity. The carrying capacity is the maximum number of deer that can be sustained in a given locality on a long-term basis without deterioration of the habitat and without impairing the health of the animals. Under this alternative, there would be no increase in the deer harvest to aid in maintaining the deer herd near the area's carrying capacity.

This alternative would allow for other types of public use to occur on the Virginia portion of the refuge. Impacts to vegetation as a result of these uses would be very minor resulting in no noticeable impacts to habitat.

Proposed Alternative

Expanding the area open to hunting would increase the opportunities for harvest. Though this increase would likely be minor, any increase would serve to positively impact wildlife habitat by helping to maintain the deer population near the refuge's carrying capacity, thereby preventing over-browsing of vegetation.

Impacts to vegetation by the presence of hunters should be minor. Hunter density is estimated to be around 1 hunter/100 acres in the areas most suitable for hunting. The Virginia portion of the refuge is primarily marsh and only has approximately 100 acres of land considered most suitable for hunting. Refuge-regulations would not permit the use of ATVs. Access to the expanded open area would be by boat and on foot only.

4.2.2 Impacts to Hunted Wildlife

No Action Alternative

The current level of disturbance to deer would continue. This level is not likely substantial enough to cause serious impacts.

Proposed Alternative

Deer inhabiting the Virginia portion of the refuge would be subjected to an increased but most likely minor level of disturbance by hunters.

The current harvest rate of approximately 40 deer per year is expected to continue under the proposed alternative with the potential for only a slight increase. This harvest rate should maintain the deer herd near carrying capacity which will help prevent malnutrition and disease within the herd. A reduction in the population would also reduce the incidents of vehicle-deer collisions.

4.2.3 Impacts to Non-hunted Wildlife

Hunting causes some disturbance to not only the species being hunted but other game species as well. The most likely species to be disturbed are the waterfowl that utilize the refuge's marshes and ponds as feeding and roosting areas. Concentrations of waterfowl usually peak in December but are present in moderate numbers from October to March.

No Action Alternative

Under this alternative disturbance to wintering waterfowl would remain the same, which can range from minor to moderate. Disturbance would be transitory as hunters traverse habitats by vehicle, boat, or on foot. Time and space zoning established by refuge regulations would help to minimize disturbance. On the Virginia portion of the refuge, other forms of public use such as wildlife observation and photography would still be permitted but would be infrequent in this area and cause only minor disturbances. Disturbance to other types of wildlife would likely have minor impacts as harassment or taking of any wildlife other than deer would not be permitted.

Proposed Alternative

Disturbance to wintering waterfowl could increase slightly by opening the Virginia portion of the refuge to hunting. Disturbance would be transitory as hunters traverse habitats by boat and on foot. Temporal and spatial zoning established by refuge regulations would help to minimize disturbance. Disturbance to other types of wildlife would likely have minor impacts as harassment or taking of any wildlife other than deer would not be permitted.

4.2.4 Impacts to Endangered and Threatened Species

A pair of bald eagles currently nests on the refuge each year. Typical nesting activity begins in December and continues through June. The adult pair, the fledglings, and several juveniles utilize the refuge for foraging and are present to some extent year-round.

No Action Alternative

Disturbance to endangered and threatened species caused by hunters would continue at its current level. The eagle nest is located in the area currently open to white-tailed deer hunting, however, a buffer zone around the nest would be closed to all entry beginning in mid-December.

Proposed Alternative

A Section 7 Evaluation associated with this assessment has been submitted to the Ecological Services Field Office for review. The refuge believes that action not likely to adversely affect any federally listed species. Additional hunter presence in the Virginia portion of the refuge could cause increased disturbance. Any increase is expected to be minor as threatened or endangered species are not routinely observed utilizing this area.

4.2.5 Impacts to Refuge Facilities (roads, trails, parking lots, levees)

No Action Alternative

Some damage to roads and parking lots due to hunter use during wet weather periods would occur. Damage to refuge signs may also occur. The current refuge hunt program, for twenty years, has shown these impacts to be minimal. There would be some costs associated with maintaining these facilities. These costs should be minimal relative to total refuge operations and maintenance costs and would not diminish resources dedicated to other refuge management programs

Proposed Action Alternative

Additional damage to roads and parking lots would not occur because no such facilities exist on the Virginia portion of the refuge. Additionally, costs associated with signage for an expanded hunting program would be minimal.

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4.2.6 Impacts to Wildlife Dependent Recreation

No Action Alternative

As public use levels expand across time, unanticipated conflicts between hunters and non-consumptive users may occur. Experience has proven that time (non-hunting season) and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating such conflicts. The refuge would focus other public uses (mainly fishing, wildlife observation, and wildlife photography) in areas closed to or not utilized by hunters. The Virginia portion of the refuge provides very few areas suitable for these other public uses.

The opportunities to participate in wildlife-dependent recreation would remain unchanged. Deer hunting would only be available on the North Carolina portion of the refuge. Hunters would be required to purchase the proper North Carolina hunting licenses. Purchasing non-resident licenses may be cost-prohibitive resulting in some Virginia residents choosing not to participate in the hunt. The Service would not be responding positively to public support for this expansion, therefore, public relations would not be enhanced with the local community.

Proposed Action Alternative

As in the No Action Alternative, conflicts among user groups may increase over time. Since the Virginia portion of the refuge provides few suitable areas for these other uses, opening that area to hunting should not increase such conflicts.

The opportunity to participate in wildlife-dependent recreation set forth in the National wildlife Refuge System Improvement Act of 1997, especially for Virginia residents, would be greatly increased.
The public would be allowed to harvest a renewable resource, and the refuge would be promoting a use that is compatible with the purpose for which the refuge was established.

The public would have an increased awareness of Mackay Island NWR and the National Wildlife Refuge System and support for more hunting would be met.

This alternative would also allow the public to enjoy hunting at no or little cost in a region where private land is leased for hunting, often costing a person $300-$2000/year for membership. Virginia residents would have the option of participating in the refuge hunt without being required to purchase a non-resident license.

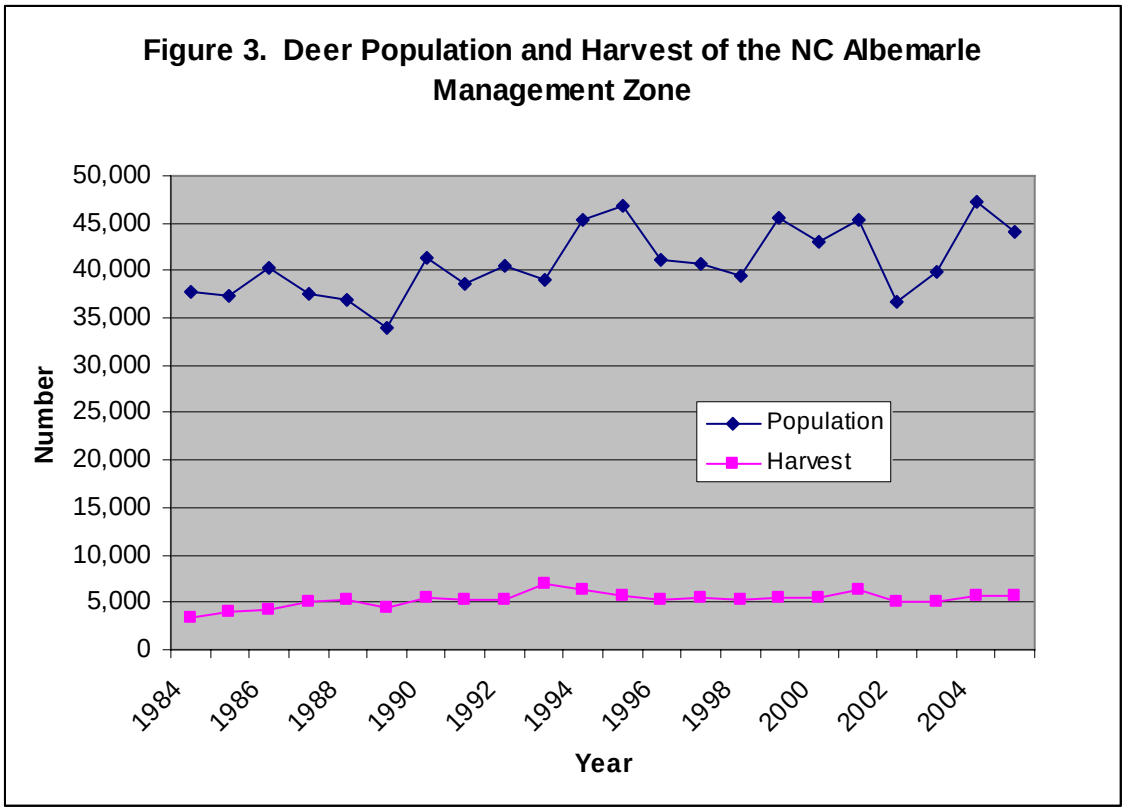
4.3 Cumulative Impacts Analysis

4.3.1 Anticipated Direct and Indirect Impacts of Proposed Action on Wildlife Species.

4.3.1.1 Resident Wildlife

Whitetail Deer

Harvest and population survey data confirm that decades of deer hunting have not had a cumulative adverse effect on the deer population in the Albemarle Management Zone (AMZ) which is comprised of a six county area including and immediately adjacent to the refuge. The North Carolina Wildlife Resources Commission (NCWRC) estimates the average deer population in the AMZ from 1984 to 2005 to be 40,813 and the average annual harvest to be 5,273. Figure 3 below illustrates a steady to slightly increasing population size over this twenty-two year period of fairly steady harvest rates. These data indicate that the regulated hunting that occurred in the AMZ during this time frame did not have any negative cumulative impacts on the regional deer population. Extrapolating from this survey data, it is reasonable to assume that a similar relationship between population levels and harvest rates could be expected on the refuge. Based on this assumption, the refuge deer population would not experience any cumulative negative impacts from the opening of the entire refuge to deer hunting.



Further, it is unlikely that expanding the open area for the refuge deer hunt will have any negative impacts to the regional population either. The majority of the refuge deer herd is located on Knotts Island which is separated from the mainland by an expansive 6,000 acre marsh. Deer are known to utilize the marsh but are expected to rarely traverse the entire area due to their home range size. As a result, the majority of deer on the refuge are thought to be part of a relatively "closed" population. This isolated condition supports the assumption that refuge deer hunts will have little affect on the regional deer population and illustrates the need for a comprehensive refuge hunting program to properly manage white-tailed deer populations. Even if there is more exchange between the regional and refuge populations than assumed, the refuge only experienced an average annual harvest of 70 deer from 1984 to 2005 which represents only 1.3% of the AMZ average harvest. Expansion of hunting on 880 acres of refuge lands for a maximum of 20 days (state season ranged from 65 to 72 days from 1984 to 2005) should not have negative cumulative impacts on the regional deer herd.

Indirect impacts of the proposed expansion to whitetail deer include improving the health of both the deer herd and that of the individual animals. Deer herd health checks are conducted approximately every 5 years on Mackay Island NWR by the Southeast Cooperative Wildlife Disease Study at the University of Georgia. In 2002, the health check report stated that "…the herd is near or possibly in excess of nutritional carrying capacity…" and "Any significant increase beyond current herd density can be expected to result in declines in herd health and higher rates of disease-induced mortality". Over the

five year period from 2002 to present, refuge hunts have had an average harvest of 36 deer per year, a 44% decrease from the previous 5 year average of 81 deer. A proportionate reduction in the number of hunters occurred over that same time period. If this trend continues, the deer herd is expected to grow well beyond the nutritional carrying capacity. Though the proposed alternative would have only a minor effect, it would only serve to alleviate the negative cumulative impacts of a growing deer herd.

Non-hunted Resident Wildlife

Non-hunted, resident wildlife would include birds such as bobwhite quail, woodpeckers, cardinals, titmice, wrens, chickadees, etc., small mammals such as raccoon, opossum, voles, moles, mice, shrews, and bats; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. These species have very limited home ranges and hunting could not affect their populations regionally; thus, only local effects will be discussed.

The cumulative effects of disturbance to non-hunted resident wildlife under the proposed action are expected to be negligible for the following reasons. Birds are very mobile and able to alter their movement patterns when temporarily disturbed by hunters traversing their habitat. Most small mammals are nocturnal in nature and are therefore most active during periods when hunters are absent. Hibernation or torpor by cold-blooded reptiles and amphibians also limits their activity during the hunting season when temperatures are cooler. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Encounters with reptiles and amphibians in the early fall are few and should not have cumulative negative effects on reptile and amphibian populations. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than deer is illegal.

4.3.1.2 Migratory Species

Migratory species that may be impacted include waterfowl (ducks, geese, and swans), rails, bitterns, woodcock, snipe, and a host of migratory songbirds, as well as some bats, moths, and butterflies. Disturbance to these migratory species could have regional, local, and flyway effects. However, the cumulative effects of disturbance to migratory species under the proposed action are expected to be negligible for the following reasons. Hunting season would not coincide with the nesting season of migratory birds. Long-term future impacts that could occur if reproduction was reduced by hunting are not relevant for this reason. Deer are the only species that can be legally harvested during the hunt. Accidental take of other species would be uncommon and insignificant. Disturbance to the daily wintering activities, such as feeding and resting, of birds might occur. Disturbance to birds by hunters would be temporary as hunters traverse the area by foot, boat, or vehicle. Areas where high concentrations of migratory waterfowl occur are closed to hunting during periods of peak use. Migratory species of bats, butterflies, and moths are in torpor or have completely passed through the area by the latter half of

the hunting season. During September and October when these species are migrating; however, hunter interaction would be temporary and would not likely affect the activities of these species.

4.3.1.3 Endangered Species

Bald eagles are present on the refuge year round. A Section 7 Evaluation is being conducted in association with this assessment for opening hunting on Mackay Island NWR. It was anticipated that the proposed alternative would not likely adversely affect endangered species.

A pair of bald eagles currently nests on the refuge. Adult and juvenile bald eagles are present in areas that are open to hunting without noticeable adverse effects. A buffer area around the active bald eagle nest is closed to all entry beginning in mid-December. The nest has been successful most years and the eagles have re-built the nest after several storm events caused damage or complete destruction. The proposed expansion area is 8.3 miles north of the eagle nest.

Refer to the Section 7 Evaluation for the 2007 Sport Hunting on Mackay Island NWR for more information.

4.3.2 Anticipated Direct and Indirect Impacts of Proposed Action on Refuge Programs, Facilities, and Cultural Resources.

4.3.2.1 Wildlife-Dependent Recreation

As public use levels expand across time, unanticipated conflicts between user groups may occur. The Refuge's visitor use programs would be adjusted as needed to eliminate or minimize each problem and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups.

Very little non-hunting public use activity occurs in the area considered for expansion. This area has no facilities to encourage other uses and access is almost exclusively by boat. Allowing hunting in this area would not likely displace other public use activities.

The opportunities for hunting would expand under the proposed action. High deer densities are recognized as a problem. If they continue to increase, crop damage and reduction of some forest vegetative species are likely. Hunting would be used to keep the deer herd in balance with the habitat's carrying capacity, resulting in long-term positive impacts on wildlife habitat. Furthermore, additional hunting opportunities would address public support and improve community relations.

The refuge would control access under this alternative to minimize wildlife disturbance and habitat degradation, while allowing current and proposed compatible wildlife-dependent recreation. Some areas, such as waterfowl sanctuaries, would be closed

seasonally to hunting to minimize disturbance to wintering waterfowl.

4.3.2.2 Refuge Facilities

The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." No such facilities exist in the area that would be opened to hunting under the proposed action.

4.3.2.3 Cultural Resources

Hunting, regardless of method or species targeted, is a consumptive activity that does not pose any threat to historic properties on and/or near the Refuge. In fact, hunting meets only one of the two criteria used to identify an "undertaking" that triggers a federal agency's need to comply with Section 106 of the National Historic Preservation Act. These criteria, which are delineated in 36 CFR Part 800, state:

> 1- an undertaking is any project, activity, or program that can alter the character or use of an archaeological or historic site located within the "area of potential effect;" and
> 2- the project, activity, or program must also be either funded, sponsored, performed, licenses, or have received assistance from the agency.

Consultation with the pertinent State Historic Preservation Office and federally recognized Tribes are, therefore, not required.

No known resources of cultural importance or value exist in the area that would be opened to hunting under the proposed action.

4.3.3 Anticipated Impacts of Proposed Hunt on Refuge Environment and Community.

The refuge expects no sizeable adverse impacts of the proposed action on the refuge environment which consists of soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in areas selected for hunting; however impacts would be minimal. Hunting would benefit vegetation as it is used to keep the deer population in balance with the habitat's carrying capacity. The refuge would also control access if needed to minimize habitat degradation.

The refuge expects impacts to air and water quality to be minimal and only due to refuge visitors' automobile and boat emissions. The effect of these refuge-related activities, as well as other management activities, on overall air and water quality in the region are anticipated to be relatively negligible, compared to the contributions of industrial centers, power plants, and non-refuge related vehicle or boating traffic. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State

standards and laws.

Impacts associated with solitude are expected to be minimal given spatial and temporal zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

The refuge would work closely with State, Federal, and private partners to minimize impacts to adjacent lands and its associated natural resources; however, no indirect or direct impacts are anticipated. The newly opened areas would result in a net gain of public hunting opportunities positively impacting the general public, nearby residents, and refuge visitors. The refuge expects increased visitation and tourism to bring additional revenues to local communities but not a significant increase in overall revenue in any area.

4.3.4 Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Cumulative effects on the environment result from incremental effects of a proposed action when these are added to other past, present, and reasonably foreseeable future actions. While cumulative effects may result from individually minor actions, they may, viewed as a whole, become substantial over time. The proposed hunt plan has been designed so as to be sustainable through time given relatively stable conditions. Changes in refuge conditions, such as sizeable increases in refuge acreage or public use, are likely to change the anticipated impacts of the current plan and would trigger a new hunt planning and assessment process.

The implementation of the proposed actions described in this assessment includes actions relating to the refuge hunt program (see 2007 Sport Hunting Plan for Mackay Island NWR). These actions would have both direct and indirect effects (e.g., new site inclusion would result in increased public use, thus increasing vehicular traffic, disturbance, etc); however, the cumulative effects of these actions are not expected to be substantial.

The past refuge hunting program has been very similar to the proposed action in season lengths, species hunted, and bag limits. Changes to the hunt program in the past decade have been made to open hunting on more land within the refuge. The refuge does not foresee any changes to the proposed action in the way of increasing the intensity of hunting in the future.

4.3.5 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

National Wildlife Refuges, including Mackay Island NWR, conduct hunting programs within the framework of State and Federal regulations. Mackay Island NWR is more restrictive in its hunting regulations and seasons than the State of North Carolina and Virginia. By maintaining hunting regulations that are as, or more, restrictive than the State, individual refuges ensure that they are maintaining seasons which are supportive of management on a more regional basis. The proposed hunt plan is supported by the

NCWRC and the Virginia Department of Game and Inland Fisheries (VDGIF). Additionally, refuges coordinate with both agencies annually to maintain regulations and programs that are consistent with the State management program.

Chapter 5 Consultation and Coordination with Others

The NCWRC and the VDGIF both concur and fully support the regulated consumptive public use of the natural resources on Mackay Island NWR. The Fish and Wildlife Service also provided a review by the Regional Office personnel and staff biologists in 1999. Numerous contacts were made throughout the area of the refuge soliciting comments, views, and ideas into the development of the accompanying hunting plan in 2007.

Appendix Literature References

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